KRF
EMC Filters

Installation, Operation and Maintenance Manual

KRF EMC Filters limit high frequency noise, as well as:

- Reduce interference
- Protect sensitive equipment
- Eliminate drive cross-talk
- Meet FCC Regulation 15, Subpart J

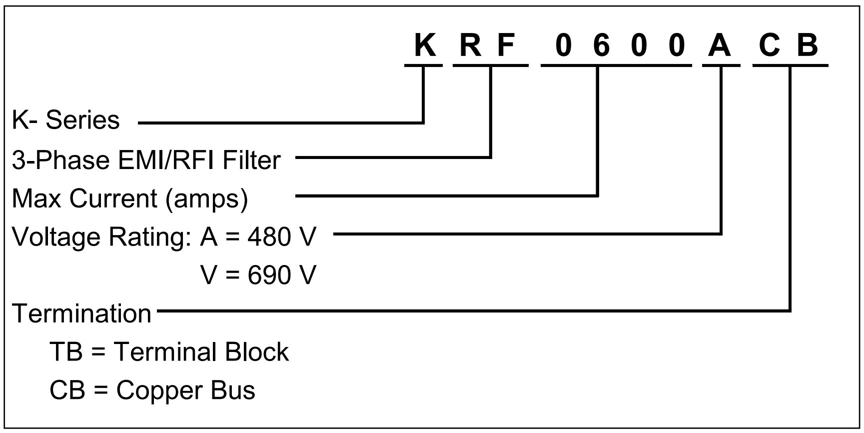
Phone: 800.894.0412 - Fax: 888.723.4773 - Web: www.clrwtr.com - Email: info@clrwtr.com

Introduction

KRF EMC 3-Phase Filters are available:

- 520V or 760V
- Terminal Block (TB) or Copper Bus (CB) terminations
- 8 to 2500 amps

Part Number System:



This manual is split into sections depending on voltage, termination, and amp rating:

Section 1: 520V, TB, 8 – 150A
Part Numbers:
KRF0008ATB
KRF0016ATB
KRF0025ATB
KRF0036ATB
KRF0050ATB
KRF0066ATB
KRF0090ATB
KRF0120ATB
KRF0150ATB

Section 2: 520V, CB, 180 – 400A
Part Numbers:
KRF0180ACB
KRF0250ACB
KRF0320ACB
KRF0400ACB

Section 3: 520V, CB, 150A & 600 – 2500A
Part Numbers:
KRF0150ACB
KRF0600ACB
KRF1000ACB
KRF1600ACB
KRF2500ACB

Section 4: 760V, TB, 25 – 180A
Part Numbers:
KRF0025VTB
KRF0036VTB
KRF0050VTB
KRF0080VTB
KRF0120VTB
KRF0150VTB
KRF0180VTB

Section 5: 760V, CB, 150 – 2500A
Part Numbers:
KRF0150VCB
KRF0180VCB
KRF0250VCB
KRF0320VCB
KRF0400VCB
KRF0600VCB
KRF1000VCB
KRF1600VCB
KRF2500VCB

Table of Contents

Cautions and Warnings 1
Mounting Instructions 3
Section 1: 520V, TB, 8 – 150A 11
Section 2: 520V, CB, 180 – 400A 21
Section 3: 520V, CB, 150A & 600 – 2500A 25
Section 4: 760V, TB, 25 – 180A 31
Section 5: 760V, CB, 150 – 2500A 38

Cautions and Warnings

Important Information

Please read all safety and warning notes carefully before installing the EMC filter and putting it into operation (see ⚠). The same applies to the warning signs on the filter. Please ensure that the signs are not removed nor their legibility impaired by external influences.

Death, serious bodily injury and substantial material damage to equipment may occur if the appropriate safety measures are not carried out or the warnings in the text are not observed.

The EMC filters may be used only for their intended application within the specified values in low-voltage networks in compliance with the instructions given in the data sheets and the data book. The conditions at the place of application must comply with all specifications for the filter used.

⚠ Warnings

- It shall be ensured that only qualified persons (electricity specialists) engage on work such as planning, assembly, installation, operation, repair and maintenance. They must be provided with the corresponding documentation.
- Danger of electric shock. EMC filters contain components that store an electric charge. Dangerous voltages can continue to exist at the filter terminals for longer than five minutes even after the power has been switched off.
- The protective earth connections shall be the first to be made when the EMC filter is installed and the last to be disconnected. Depending on the magnitude of the leakage currents, the particular specifications for making the protective-earth connection must be observed.
- Impermissible overloading of the EMC filter, such as impermissible voltages at higher frequencies that may cause resonances etc. can lead to destruction of the filter housing.
- EMC filters must be protected in the application against impermissible exceeding of the rated currents by suitable overcurrent protective.
- All electrical connections must be re-torqued annually.

Important Notes

The following applies to all products named in the publication:

1. Some parts of this publication contain **statements about the sustainability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the sustainability of our products for a particular customer application**. As a rule, TCI is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether a TCI product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of passive electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of a passive electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of a passive electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as "hazardous")**. Should you have any more detailed questions, please contact TCI Technical Support.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.
   We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available.

Mounting Instructions

EMC cannot be ensured by the use of EMC filters alone. Every system should be considered as an integrated whole and careful planning and preparation are required to ensure success. Measures such as shielded motor cables, grounding and spatial separation are mandatory parts of an integrated concept.

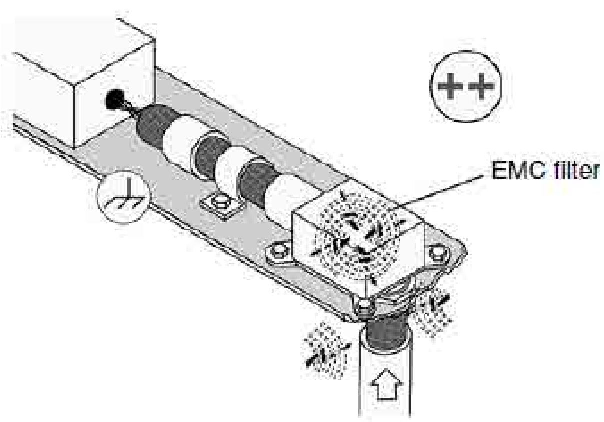
Plan your installation:

- Identify interference sources (with interference emissions) and disturbed equipment (electrical equipment or components with limited interference immunity).
- Assign interference sources and disturbed equipment to specific zones and separate them spatially from each other.
- Plan the cabling in wiring categories in accordance with interference emissions and interference immunity.

EMC is an indispensable quality feature! The legally stipulated protection objectives and technical risks must be taken into consideration as early as the development stage of the system.

In order to achieve electromagnetic compatibility of the overall system the following points must be observed:

1. The filter case should be connected across a large area to ground and to the other equipment. For example, a blank metal mounting plate should be provided jointly for filters and converters. It should be well grounded and connected to the switch cabinet via a large-area low-inductance connection. If necessary, use short copper tapes and EMC seals (e.g. connection to switch cabinet doors).



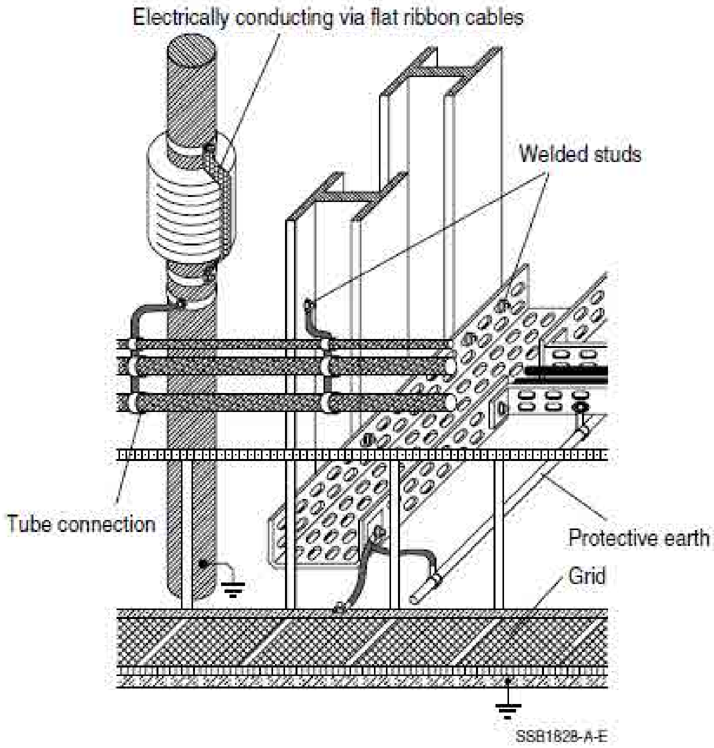
2. A distinction should be made between
   a. The protective earth connection of the EMC filter, which is used to secure protection against hazardous body currents, and
   b. The large-area grounding of the filter, which is required for its interference suppression function.

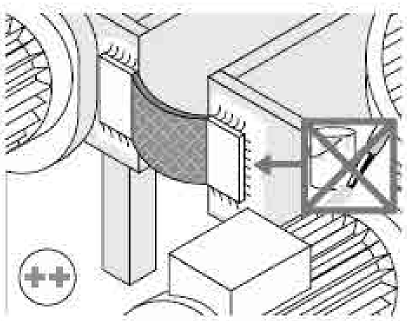
For operating currents greater than 250 A, we recommend the PE connection to be set up between the feed (filter: line) and output (filter: load) not via the PE terminal bolt in the filter housing. This is because of the restricted area of the cable lug of the PE connection to the filter housing. Ideally, the PE feed line should be connected with the PE output line to a PE busbar which also carries the PE terminal(s) of the EMC filter. The number of necessary PE connections to the filter depends on the cross-section and the required KU factor as a function of the magnitude of the leakage current. The PE conductor connections must satisfy the requirements defined in IEC 60364-5-54 (DIN VDE 0100 T540). For currents >1000 A and/or short-circuit currents >25 kA, it is not permissible to loop the PE conductor through the filter housing.

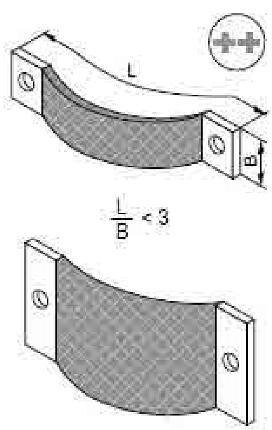
3. In your system, set up connections at the same reference potential in order to reduce galvanically coupled interferences. All metallic reference potentials of housings, machines and installations should be linked via a low-impedance connection suited for RF and intermeshed as far as possible.
   Set up large-area metallic connections, use equipotential busbars and set up short connections to ground via flat ribbon cables.

The following conditions apply:

- Large-area ground connection,
- Low-inductance connection (preferably a copper ribbon and not circular conductors),
- Short connections (rule of thumb: length divided by width < 3).







4. Keep cables from the interference source as short as possible!

   Examples:
   - Short connection from the converter to the EMC filter; ideally a flange mounted filter to avoid emissions.
   - Connection cables of minimum length between converter output and motor (also to reduce asymmetrical currents caused by the parasitic capacitances of the cable shield).

5. Interference-carrying cables must be shielded!

   Examples:

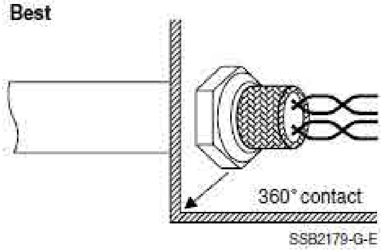
- Connection cables between frequency converter and motor, if no corresponding output filter is used.
- Connection cables filter and converter on the line side, where not directly flange mounted
- It should be noted that the shielding effect of different cables can differ widely (foil shield, braided shield with various degree of coverage, combinations).

6. Connect shielded cables on both sides and across a large-area with reference potential, as far as possible directly or close to the input or output sides of the housing.

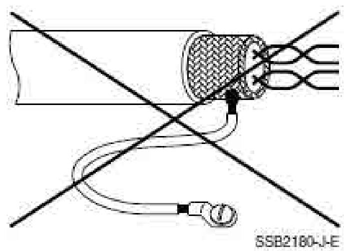
   Use:
- EMC-compliant cable fittings (360° contact)
- An EMC baseplate
- Large-area contacting of the cable shield by suitable metal clips.

Avoid shielded terminals connected via top lines (pig tails)!
(Twisted shield braiding; soldered cable lugs etc.)

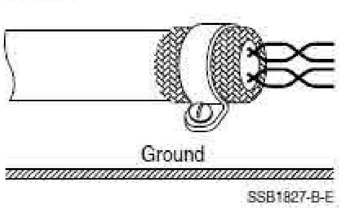
Best



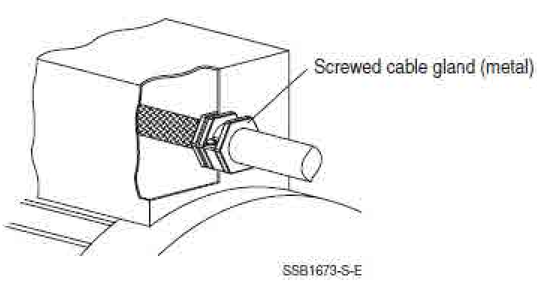
No



Correct

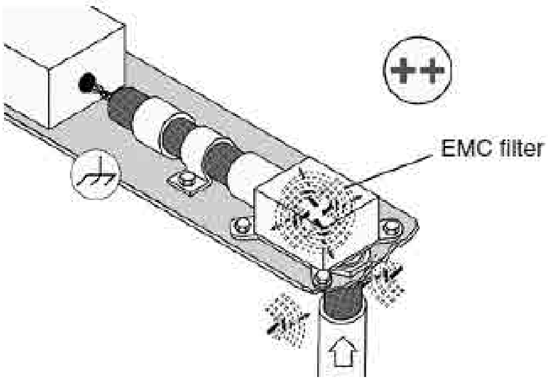


Ensure that an EMC-compliant cable gland is provided at the motor terminal box. It must correspond to the degree of protection for its respective location of use. The motor terminal box shall be made of metal, the connection between cable gland and terminal box must be of large-area design. If the lacquer has been removed, it may be necessary to restore the corrosion-protection layer.



7. Arrange EMC filters as far as possible directly at the entry or exit points of the housing Examples:

- Line terminals are accessible via the corresponding opening of the equipment (ensure protection against electric shock).
- Use of suitable EMC filters.
- Use of corresponding housing matching elements to ensure the required shielding attenuation

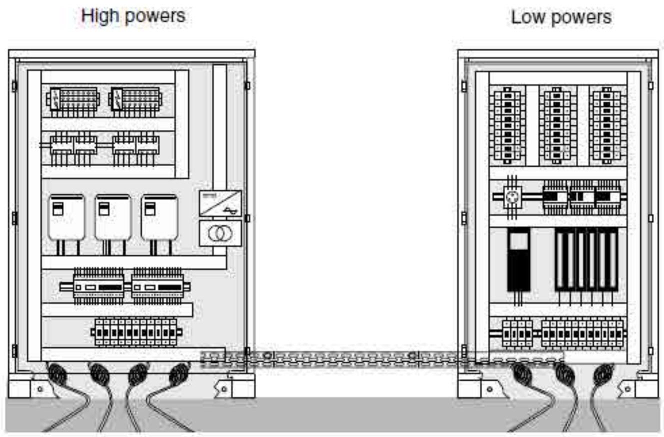


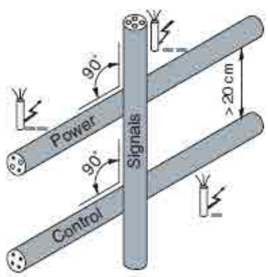
8. Spatial separation between interference-emitting and “clean” cables must be ensured (noisy cables include those between converter and filter, whereas “clean” cables include those between mains supply and filter).

   Avoid running cables in parallel (to reduce coupled interferences).

   Note the spatially separated laying of signal and power cables in order to avoid coupling routes (minimum recommended spacing 20cm). Use separating metal plates and ground them across a wide area if necessary.

   As far as possible, run cable cross-overs at right angles and keep them well separated.

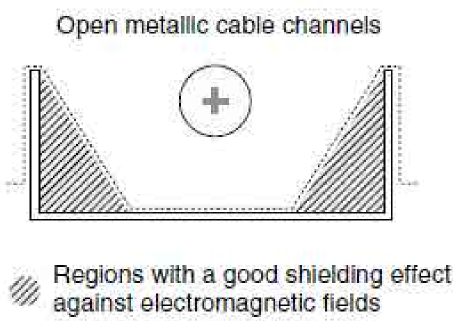




9. In order to reduce interference coupling, as far as possible run the cables close to metal parts which are connected to the reference potential (mounting plates, switch cabinet etc.)

   Live cables should also be run as close as possible to the reference potential (to reduce inductively coupled interferences).

   In order to improve electromagnetic compatibility, cable channels, cable trays and installation tubes which are made of metal rather than plastic parts should be preferred.



10. In the case of unshielded signal cables (forward and return lines) use twisted-pair cables in order to minimize the area between the wires (to avoid magnetic coupling). The same applies to avoiding loops.

11. Connect suitable EMC components close to switched inductors (e.g. contactors, relays, magnetic valves etc.).

12. For control signals in the vicinity of high interference levels, use transmission techniques such as:
    - Differential-mode transmission systems with twisted-pair lines in conjunction with data line chokes.
    - Transmission of digital signals according to the RS-422 standard or in extreme cases crossing the interference region with fiber-optic cables.

13. Note the mounting position of the filters! The assembly must always take care not to impair natural convection. This includes the use of ventilation slits in the filter housing and sufficient spacing to the other components. Over-head mounting is never permissible. In the event of unusual mounting situations, the thermal conditions shall be checked after coordination with the factory.

14. Noise minimization

    A choke made of highly diverse core materials represents a significant frequency-dependent filter component. Electro-acoustic effects must inevitably be expected in AC applications. The materials and processing used generate (for industrial sector) suitable noise levels by operation in networks with harmonics complying to EN 50160. However, these can rise significantly in the event of higher harmonic components. For sensitive applications such as office installation, therefore, customers should contact factory for advice.

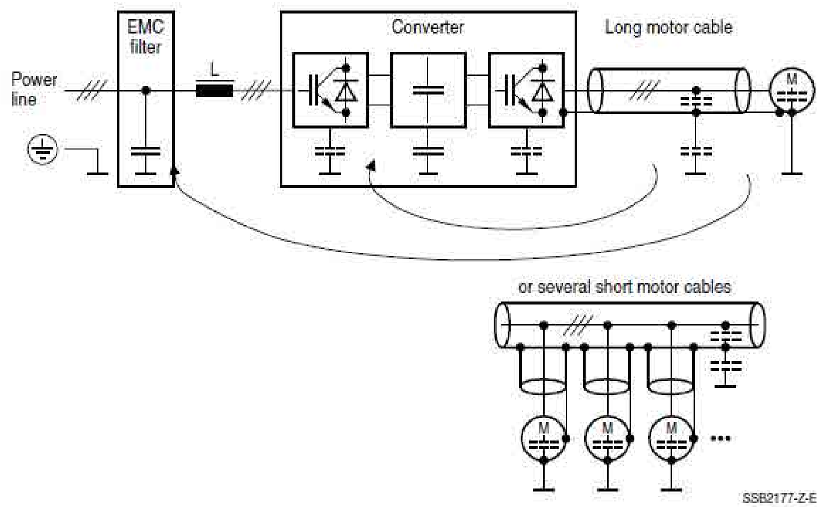
15. Length of motor cables and motor types used

    For converter applications, output voltages are generated that typically have almost rectangular waveforms. These are essentially characterized by the rise rate expressed as the dv/dt value and the switching frequency of the converter. The cables and motors present in the output network of the converter with their inductive and capacitive components significantly determine the EMC properties of the system. Thus resonances of the cable/motor combination are often reflected in the resonance of the interference voltage measurement at the converter input.

    The parasitic capacitances of the cable and motor should be treated with special care. Whereas the parasitic capacitances of the motor depend on its design, those of the cables depend on the insulation material, cable structure, type of shielding and especially on their length. A high-frequency current flows through the grounded parts of the equipment as a function of the switching frequency, the dv/dt value and the magnitude of the parasitic capacitances.

    Here are some of the possible effects:

- As the parasitic currents flow via the ground connection of the installation, the sum of the input currents into the filter is no longer equal to zero. A specific magnitude of the parasitic current can lead to a saturation of the common-mode choke in the EMC filter and consequently exceed the permissible interference level. The interference voltage should therefore be measured on the installed equipment.
- The parasitic currents also flow to the interference source via the filter housing and the capacitors connected in the filter! Impermissibly high currents can overload the capacitors and thus endanger the equipment!



Section 1: 520V, TB, 8 – 150A

EMC Filters
Phase: 3
Current: 8 to 150 A
Voltage: 520/300 V AC, 50/60 Hz
Termination: Terminal Block

Part Numbers:
KRF0008ATB
KRF0016ATB
KRF0025ATB
KRF0036ATB
KRF0050ATB
KRF0066ATB
KRF0090ATB
KRF0120ATB
KRF0150ATB

Construction
• 3-line filter
• Metal case
• Book size

Features
• Excellent price/performance ratio
• Ultra-compact design
• Low weight
• Easy to install
• Optimized for long motor cables and operation under full load
• ENEC10, UL, and cUL approval

Applications
• Frequency converters for motor drives, e.g.
  - elevators
  - pumps
  - traction systems
  - HVAC systems (heating, ventilation and air conditioning)
• Power supplies

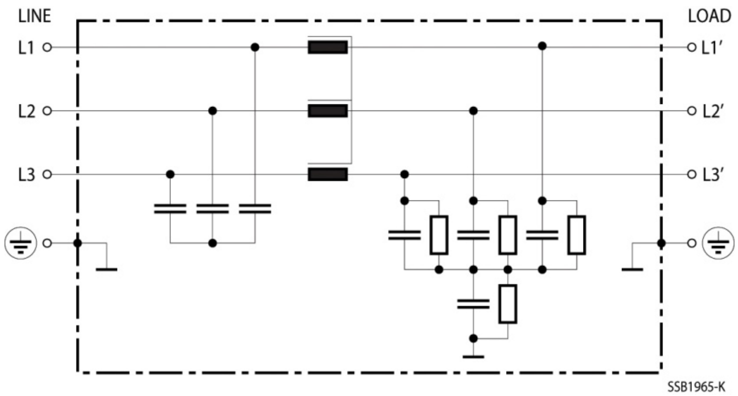
Terminals
• Finger-safe terminal blocks

Marking

Marking on component:

Manufacturer’s logo, ordering code,
rated voltage, rated current, rated temperature,
climatic category, date code

Typical Circuit diagram



Technical data and measuring conditions

Rated voltage V_R	520/300 V AC, 50/60 Hz
Read current I_R	Referred to 40°C ambient temperature
Test voltage V_{test}	2236 V DC, 2 s (line/line) 2720 V DC, 2 s (lines/case)
Overload capability (thermal)	1.5 · I_R for 3 min per hour or 2.5 · I_R for 30 s per hour
Leakage current I_{leak}	At 520 V AC, 50 Hz
Climatic category (IEC 60068-1)	25/100/21 (-25°C/+100°C/21 days damp heat test)
Approvals	EN 133200, UL 1283, CSA C22.2 No.8)

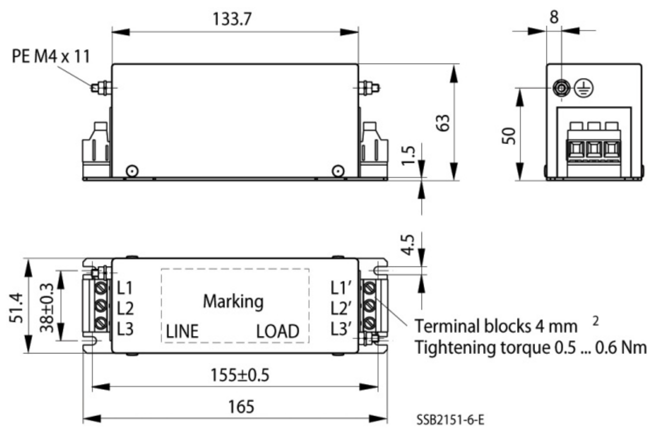
Characteristics and part numbers

V_R AC V	I_R A	Terminal cross section mm^2	I_{leak} mA	R_{typ} µΩ	Approx weight kg	Part Number	Approvals		
520/300	8	4	13	16	0.58	KRF0008ATB	X	X	X
	16	4	15	9	0.90	KRF0016ATB	X	X	X
	25	4	15	5	1.10	KRF0025ATB	X	X	X
	36	10	15	4	1.75	KRF0036ATB	X	X	X
	50	10	15	2	1.75	KRF0050ATB	X	X	X
	66	16	16	1.5	2.7	KRF0066ATB	X	X	X
	90	35	18	1.1	4.2	KRF0090ATB	X	X	X
	120	35	18	0.90	4.9	KRF0120ATB	X	X	X
	150	50	18	0.55	5.3	KRF0150ATB	X	X	X

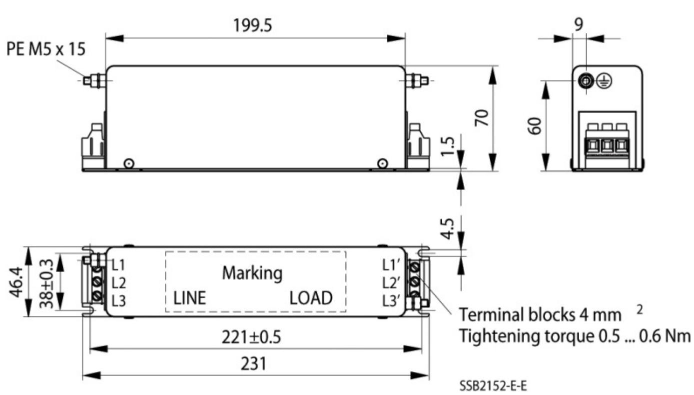
X = approval granted

Dimensional drawings

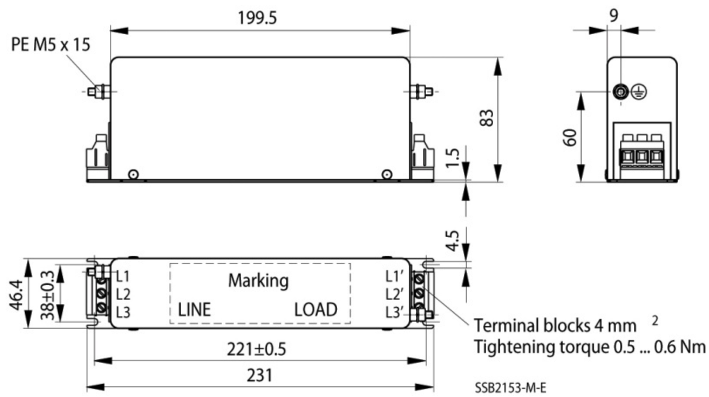
(8 A) KRF0008ATB



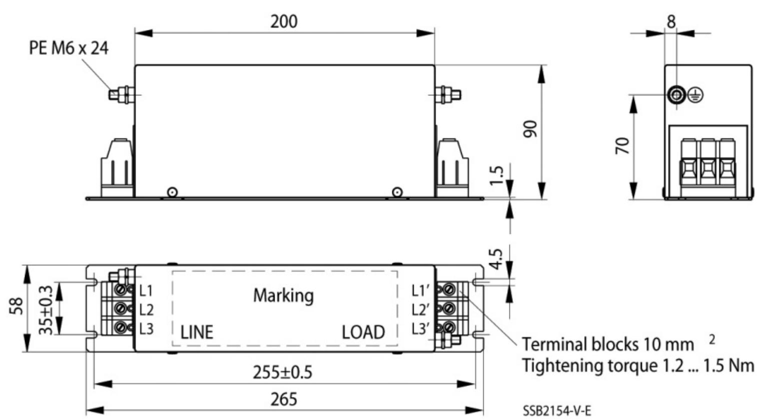
(16 A) KRF0016ATB



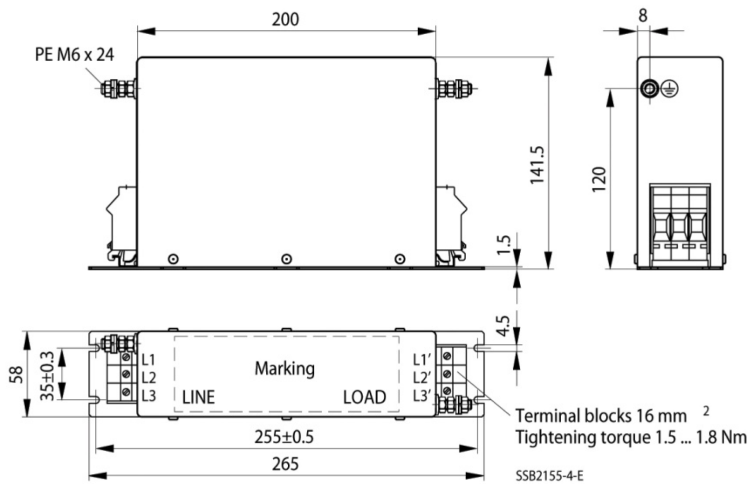
(25 A) KRF0025ATB



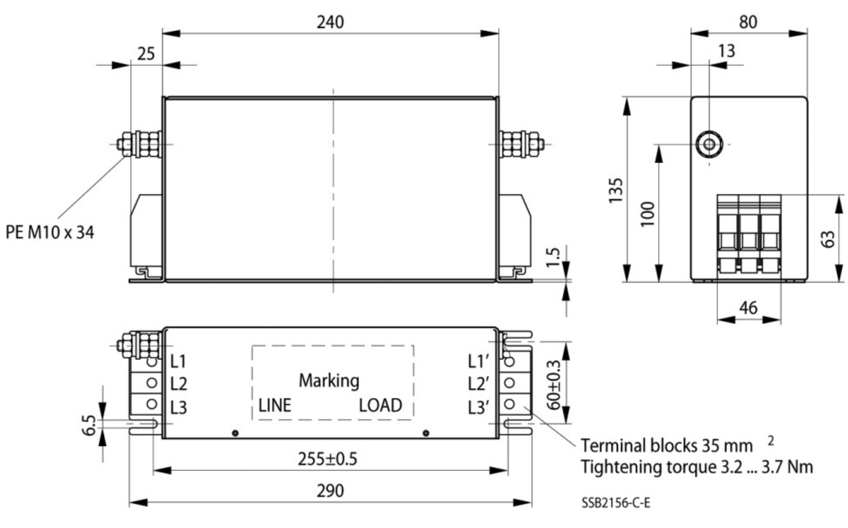
(600 A) KRF0036ATB, KRF0050ATB



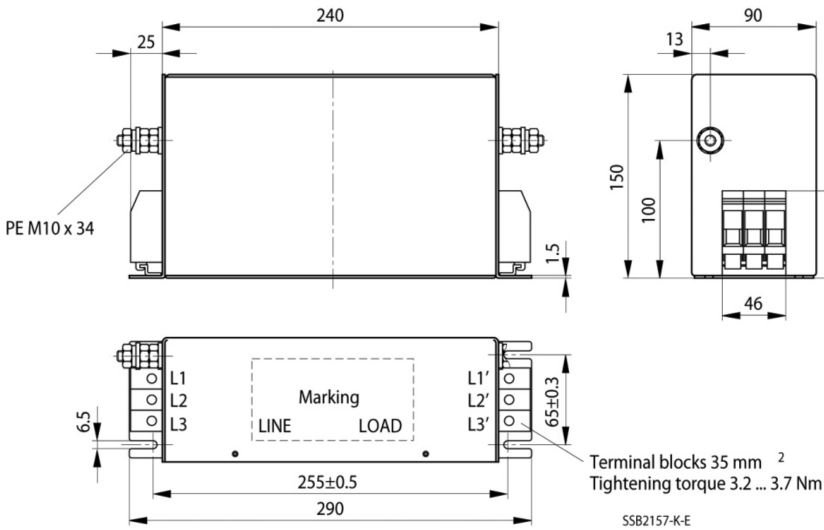
(66 A) KRF0066ATB



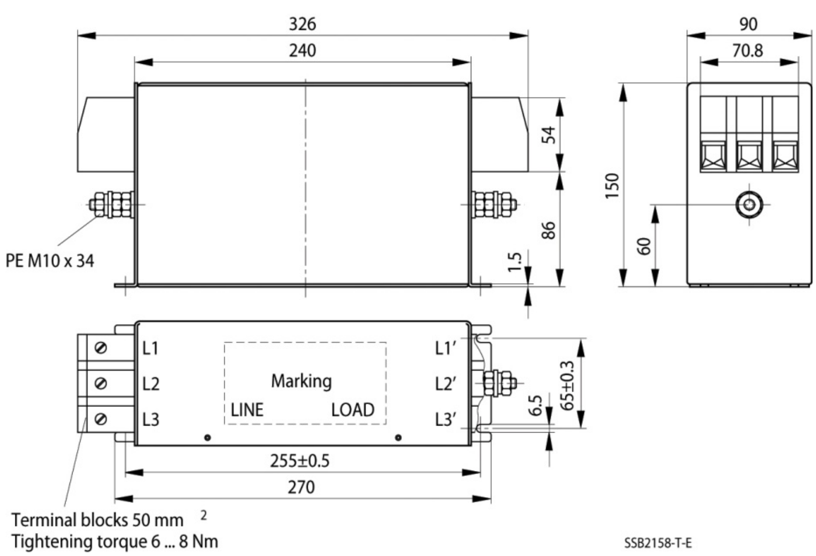
(90 A) KRF0090ATB



(120 A) KRF0120ATB

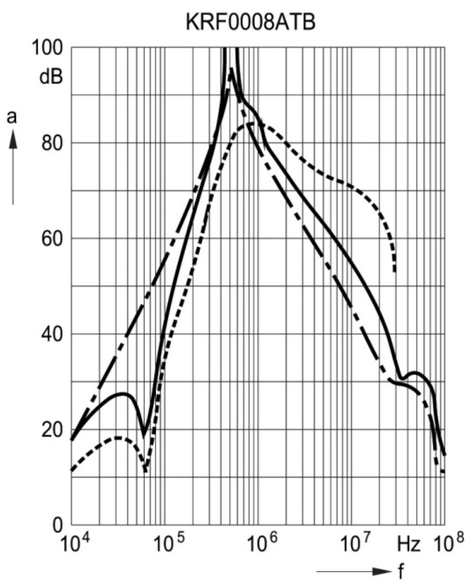


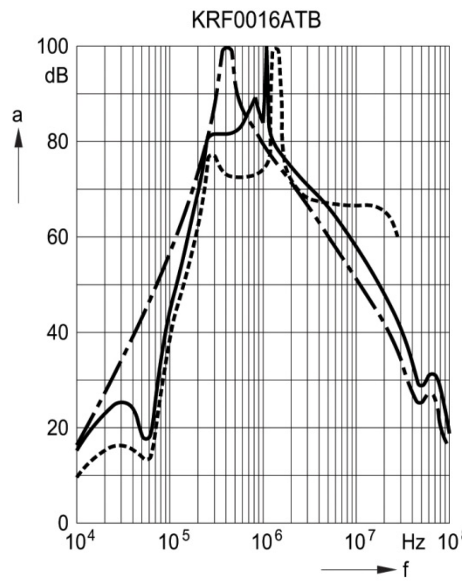
(150 A) KRF0150ATB

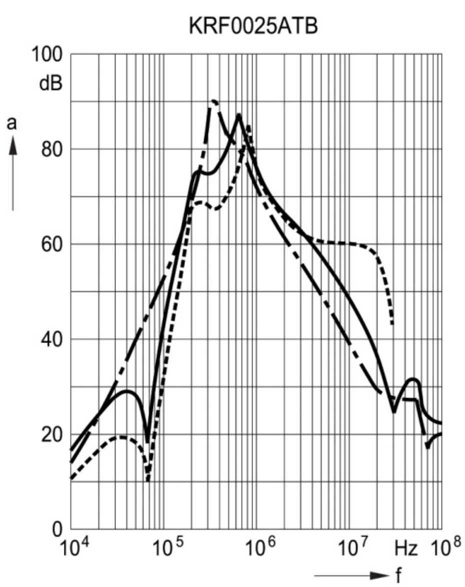


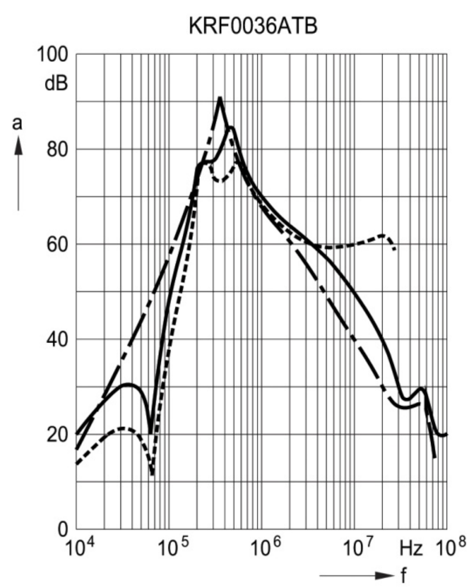
Insertion Loss (typical values at Z = 50 Ω)

———————	Unsymmetrical, adjacent branches terminated
— · — · — ·	Common mode, all branches in parallel (asymmetrical)
— — — —	Differential mode (symmetrical)









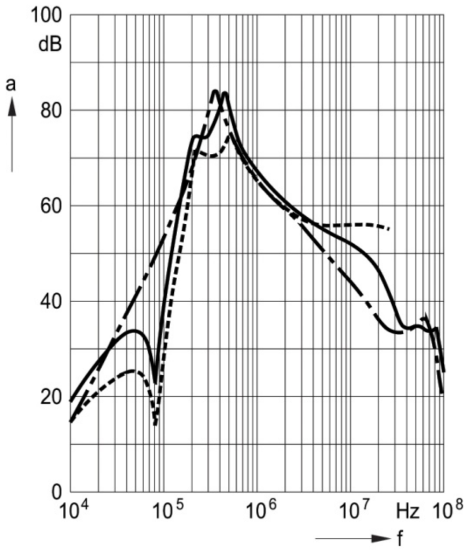
Insertion Loss (typical values at Z = 50 Ω)

——————— Unsymmetrical, adjacent branches terminated

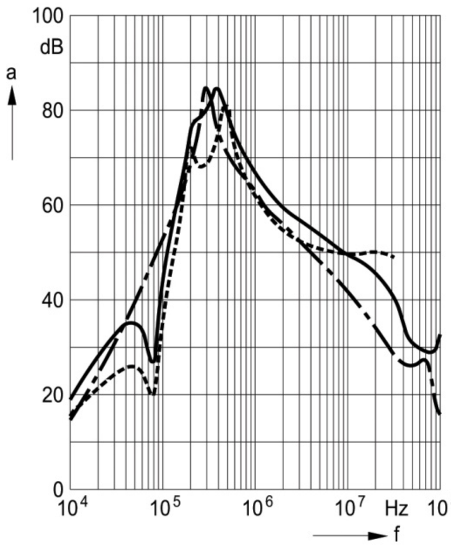
— · — · — Common mode, all branches in parallel (asymmetrical)

— — — — Differential mode (symmetrical)

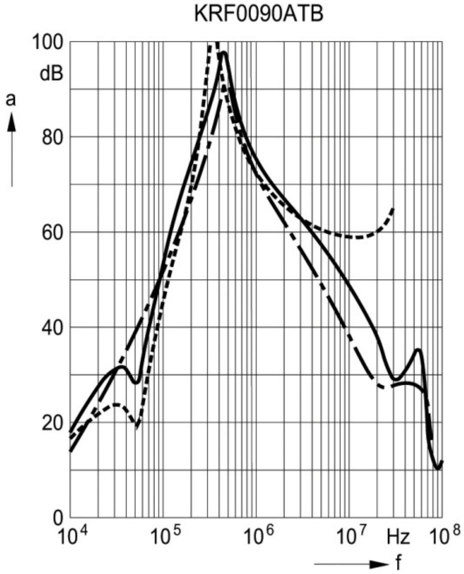
KRF0050ATB



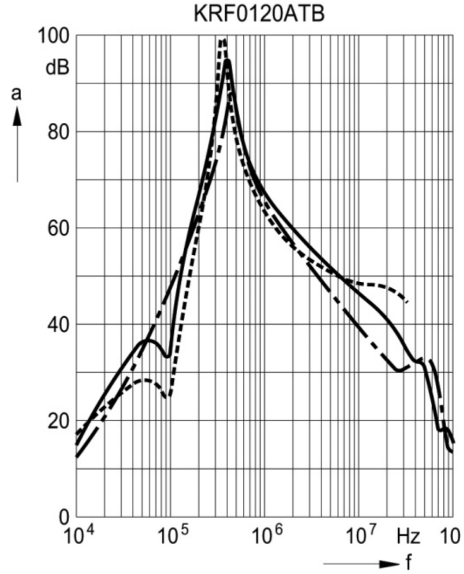
KRF0066ATB



KRF0090ATB



KRF0120ATB

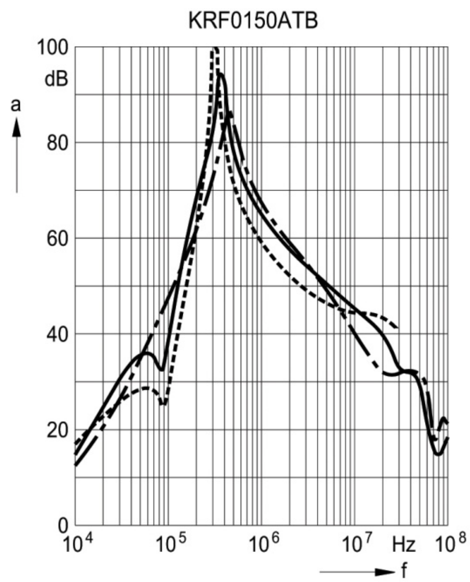


Insertion Loss (typical values at Z = 50 Ω)

——— Unsymmetrical, adjacent branches terminated

— · — · — · Common mode, all branches in parallel (asymmetrical)

— — — — Differential mode (symmetrical)



Section 2: 520V, CB, 180 – 400A

EMC Filters
Phase: 3
Current: 180 to 400 A
Voltage: 520/300 V AC, 50/60 Hz
Termination: Copper Bus

Part Numbers:
KRF0180ACB
KRF0250ACB
KRF0320ACB
KRF0400ACB

Construction
• 3-line filter
• Metal case

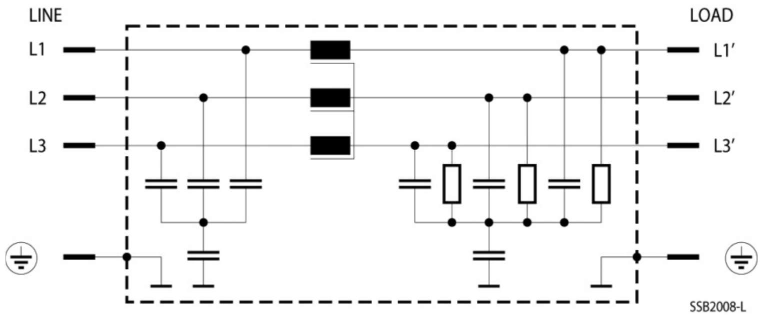
Features
• Optimized leakage current
• Easy to install
• Very compact design
• Optimized for operation under full load
• Low weight
• Design complies with
EN 133200, UL 1283, CSA C22.2 No.8
• UL, cUL approval

Applications
• Frequency converters for motor drives
• Wind farms
• Power supplies

Terminals
• Busbars

Marking
Marking on component:
Manufacturer's logo, ordering code,
rated voltage, rated current, rated temperature,
climatic category, date code

Typical circuit diagram



Technical data and measuring conditions

Rated voltage V_R	520/300 V AC, 50/60 Hz
Read current I_R	Referred to 40°C ambient temperature (180 A filter at 60°C
Test voltage V_{test}	2240 V DC, 2 s (line/line) 2690 V DC, 2 s (lines, case)
	3270 V DC, 2 s (line/line) 2890 V DC, 2 s (lines/case)
	1.5 · I_R for 3 min per hour or 2.5 · I_R for 30 s per hour
Overload capability (thermal)	520 V AC, 50 Hz
Leakage current I_{leak}	25/100/21 (-25°C/+100°C/21 days damp heat test)
Climatic category (IEC 60068-1)	UL 1283; CSA C22.2 No.8

Characteristics and ordering codes

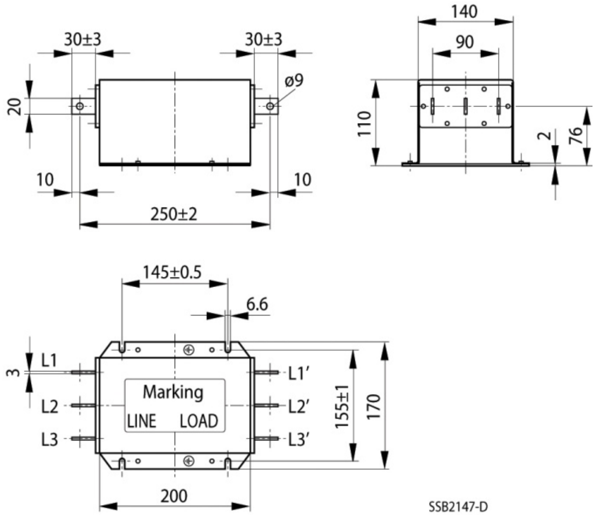
V_R AC V	I_R A	I_{leak} mA	R_{typ} µΩ	Approx weight kg	TCI Number	Approvals UL 500/290V	Approvals cUL 500/290V
520/300	180[1]	< 21	110	5.0	KRF0180ACB	X	X
	250	< 21	110	5.0	KRF0250ACB	X	X
	320	< 21	51	7.2	KRF0320ACB	X	X
	400	< 21	48	7.5	KRF0400ACB	X	X

X = approval granted

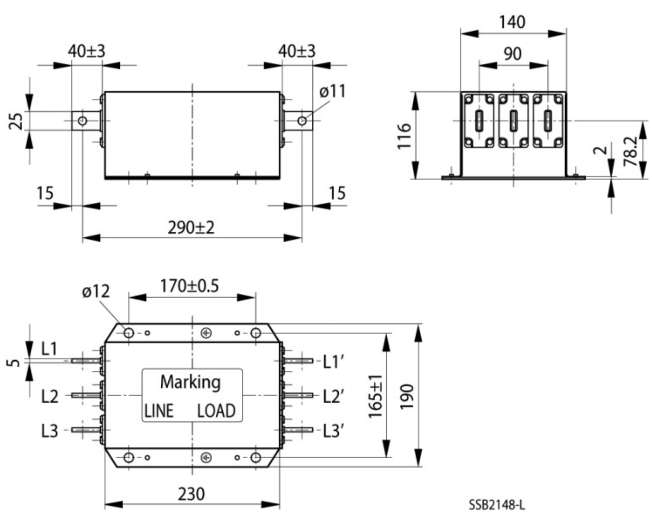
1) KRF0180ACB referred to 60°C ambient temperature

Dimensional drawings

(180 A, 250 A) KRF0180ACB, KRF0250ACB



(320 A, 400 A) KRF0320ACB, KRF0400ACB

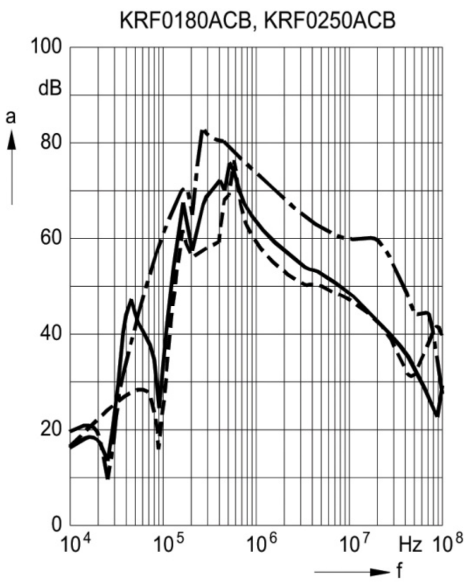


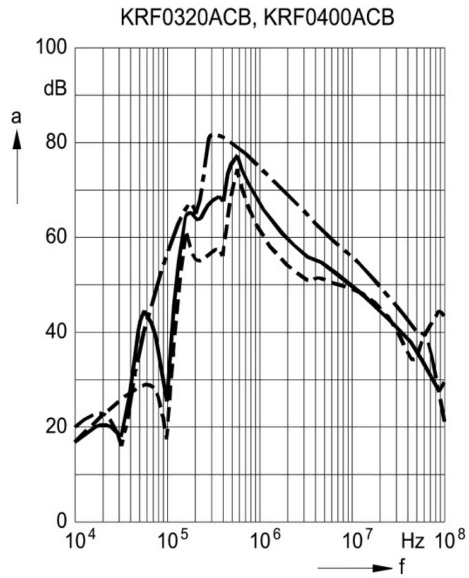
Insertion Loss (typical values at Z = 50 Ω)

——— Unsymmetrical, adjacent branches terminated

— · — · — Common mode, all branches in parallel (asymmetrical)

— — — — Differential mode (symmetrical)





Section 3: 520V, CB, 150A & 600 – 2500A

EMC Filters
Phase: 3
Current: 150 A; 600 to 2500 A
Voltage: 520/300 V AC, 50/60 Hz
Termination: Copper Bus

Part Numbers:
KRF0150ACB
KRF0600ACB
KRF1000ACB
KRF1600ACB
KRF2500ACB

Construction
- 3-line filter
- Metal case

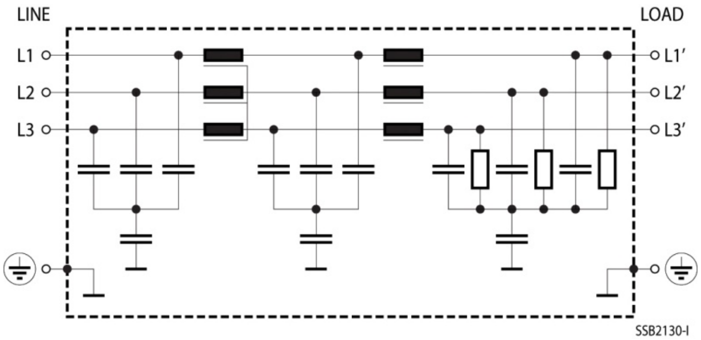
Features
- Optimized leakage current
- Easy to install
- Very compact design
- Optimized for operation under full load
- Low weight
- UL, cUL approval

Applications
- Frequency converters for motor drives
- Wind farms
- Power supplies

Terminals
- Busbars

Marking
Marking on component:
Manufacturer's logo, ordering code,
rated voltage, rated current, rated temperature,
climatic category, date code

Typical circuit diagram



Technical data and measuring conditions

Rated voltage V_R	530/310 V AC, 50/60 Hz
Read current I_R	Referred to 40°C ambient temperature
Test voltage V_{test}	2280 V DC, 2 s (line/line) 2690 V DC, 2 s (lines, case)
	1.5 · I_R for 3 min per hour or 2.5 · I_R for 30 s per hour
Overload capability (thermal)	At V_R, 50 Hz
Leakage current I_{leak}	25/100/21 (-25°C/+100°C/21 days damp heat test)
Climatic category (IEC 60068-1)	UL 1283; CSA C22.2 No.8 (Type: 500/290 V)

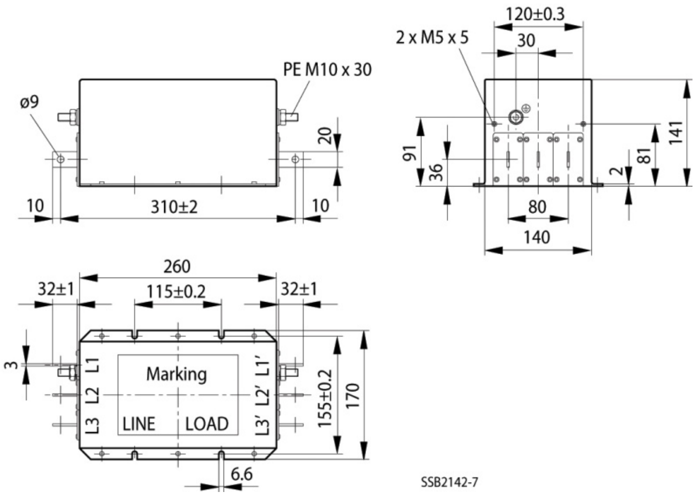
Characteristics and part numbers

V_R AC V	I_R A	I_{leak} mA	R_{typ} µΩ	Approx weight kg	Part Number	Approvals	
						500/290V	
530/310	150	< 20	140	13	KRF0150ACB	X	X
	600	< 20	52	22	KRF0600ACB	X	X
	1000	< 20	33	28	KRF1000ACB	X	X
	1600	< 20	22	34	KRF1600ACB	X	X
	2500	< 20	15	105	KRF2500ACB	X	X

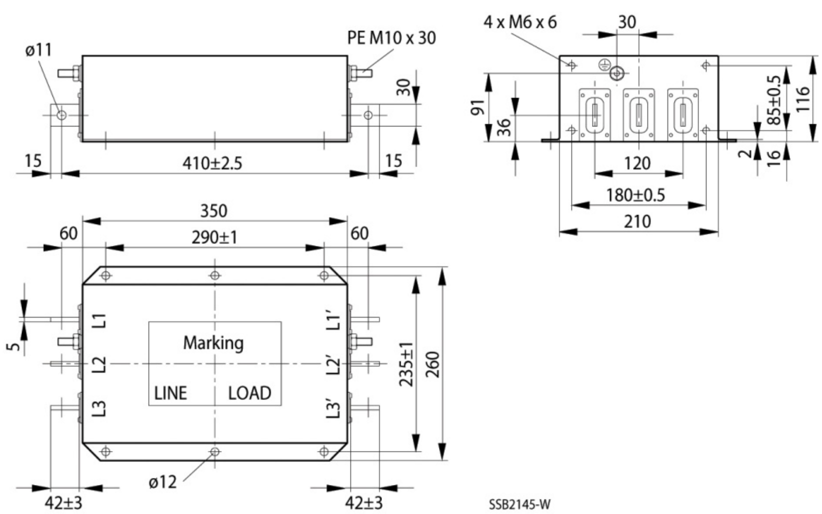
X = approval granted

Dimensional drawings

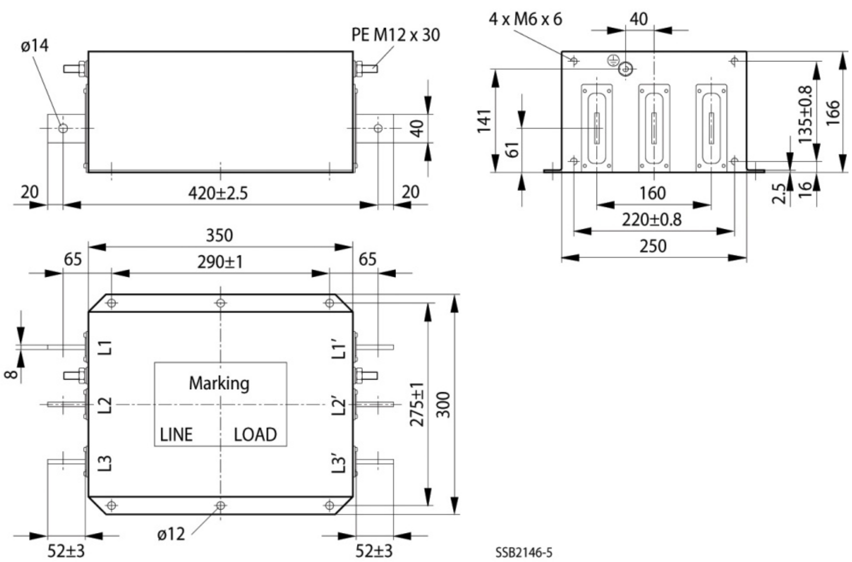
(150 A) KRF0150ACB



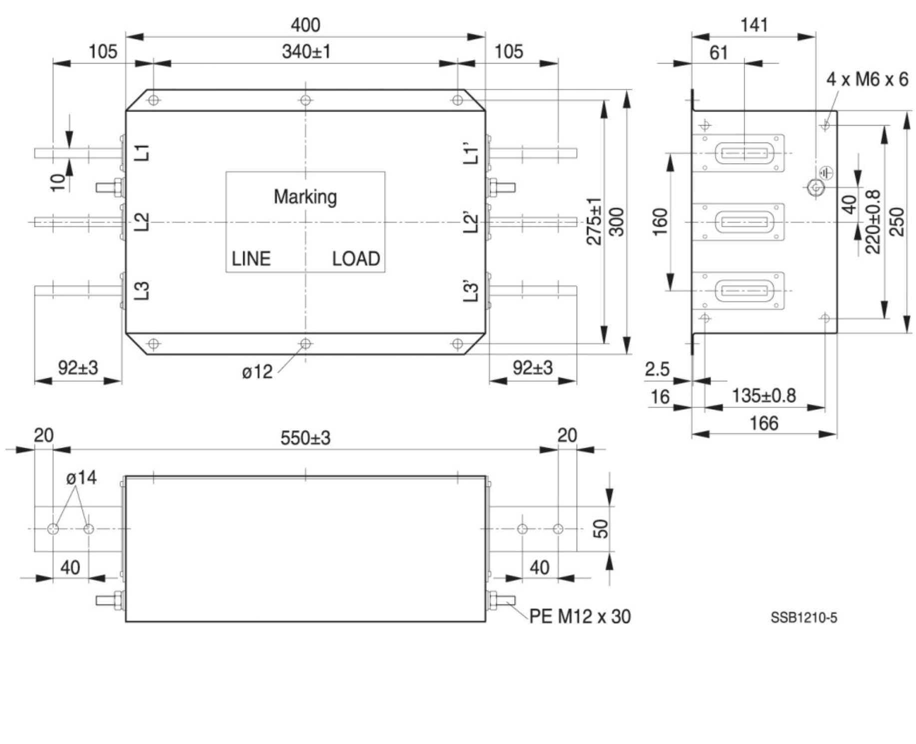
(600 A) KRF0600ACB



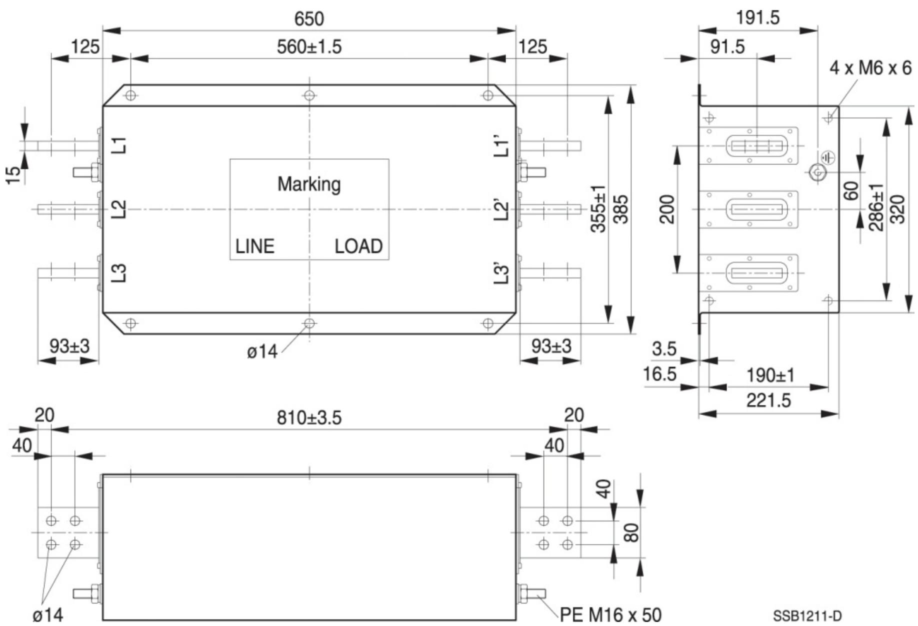
(1000 A) KRF1000ACB



(1600 A) KRF1600ACB



(2500 A) KRF2500ACB

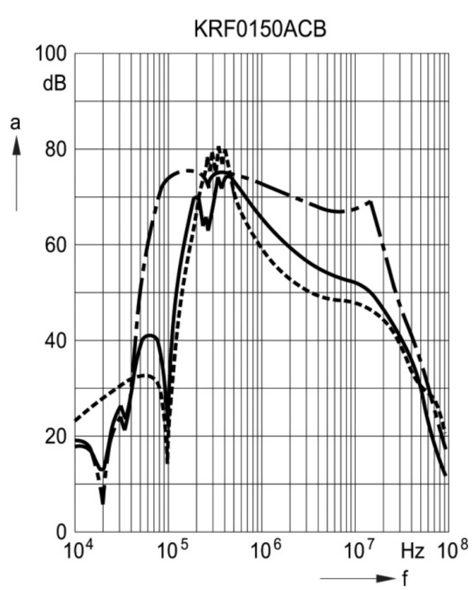


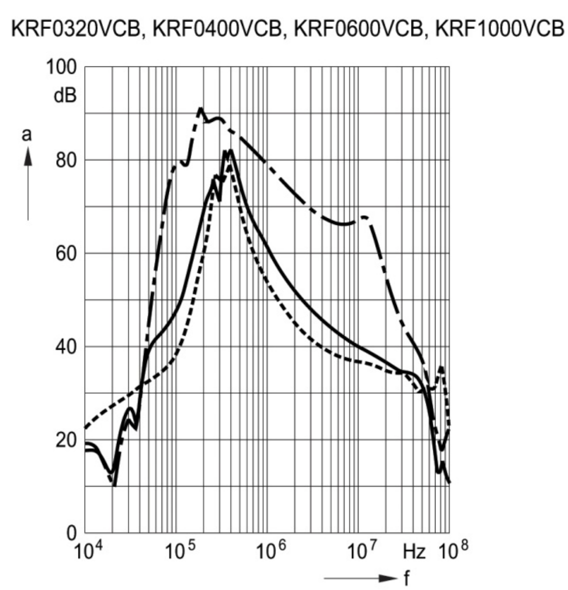
Insertion Loss (typical values at Z = 50 Ω)

Unsymmetrical, adjacent branches terminated

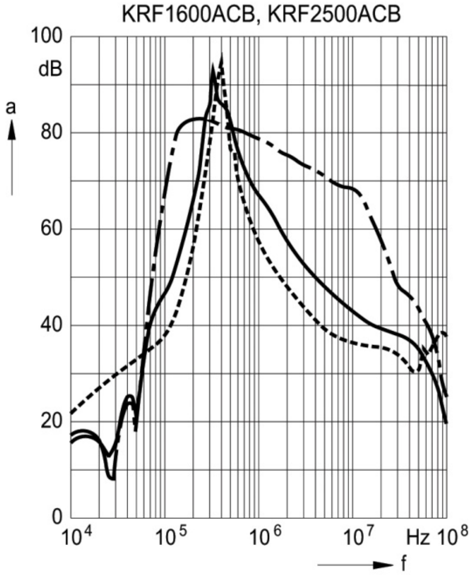
Common mode, all branches in parallel (asymmetrical)

Differential mode (symmetrical)

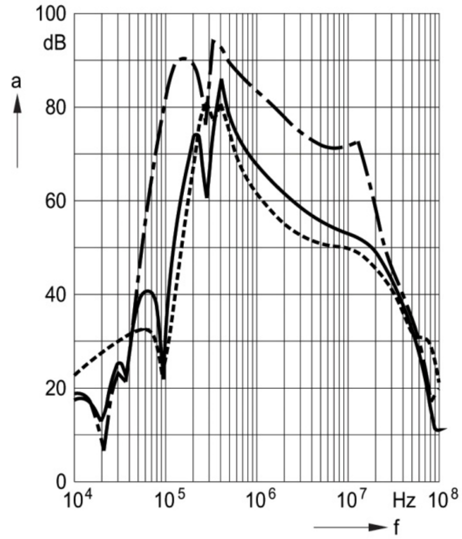




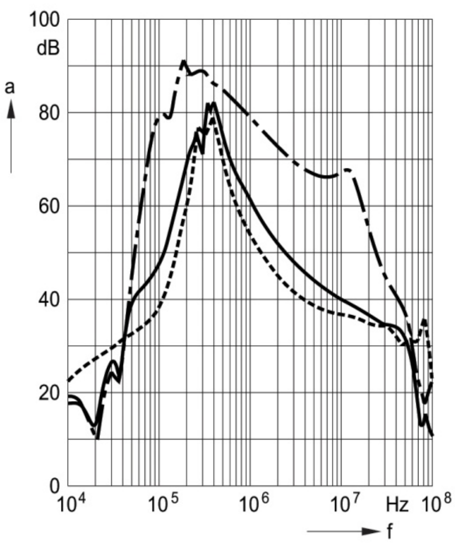
KRF1600ACB, KRF2500ACB



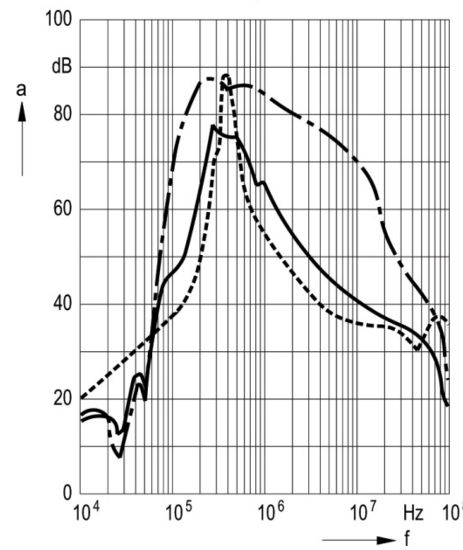
KRF0150VCB, KRF0180VCB, KRF0250VCB



KRF0320VCB, KRF0400VCB, KRF0600VCB, KRF1000VCB



KRF1600VCB, KRF2500VCB



Section 4: 760V, TB, 25 – 180A

EMC Filters
Phase: 3
Current: 25 to 180 A
Voltage: 760/440 V AC, 50/60 Hz
Termination: Terminal Block

Part Numbers:
KRF0025VTB
KRF0036VTB
KRF0050VTB
KRF0080VTB
KRF0120VTB
KRF0150VTB
KRF0180VTB

Construction
• 3-line filter
• Metal case

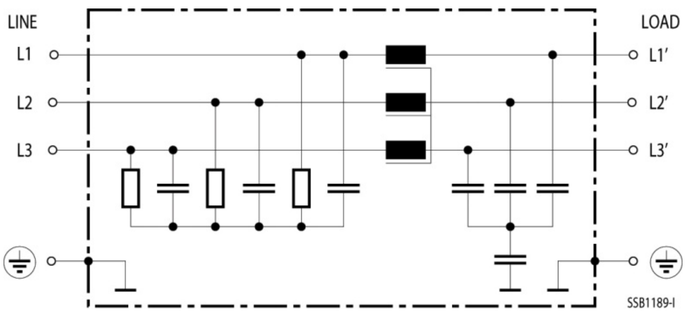
Features
• High insertion loss
• Low leakage current
• Easy to install
• Degree of protection IP 20 (IEC 60529:2001)
• Space saving design
• Design complies with
  IEC/EN 60939, UL 1283, CSA 22.2 No. 8
• Optimized for long motor cables and operation
  under full load
• UL and cUL approval

Applications
• Frequency converters for motor drives, e.g.
  - elevators
  - pumps
  - traction systems
  - conveyor systems
  - HVAC systems (heating, ventilation and air conditioning)
• Wind farms
• Power supplies

Terminals
• Finger-safe terminal blocks

Marking
Marking on component:
Manufacturer's logo, ordering code,
rated voltage, rated current, rated temperature,
climatic category, date code

Typical Circuit diagram



Technical data and measuring conditions

Rated voltage	V_R	760/440	V AC
Rated frequency	f_R	50/60	Hz
Test voltage line to line for 2 s	V_{test}	3270	V DC
Test voltage line to case for 2 s	V_{test}	3000	V DC
Rated temperature	T_R	40	°C
Overload capability (thermal) for 3 min per hour or for 30 s per hour		1.5 x I_R 2.5 x I_R	
Leakage current I_{leak}		At 690	V AC, 50 Hz
Climatic category (IEC 60068-1)		25/100/21	

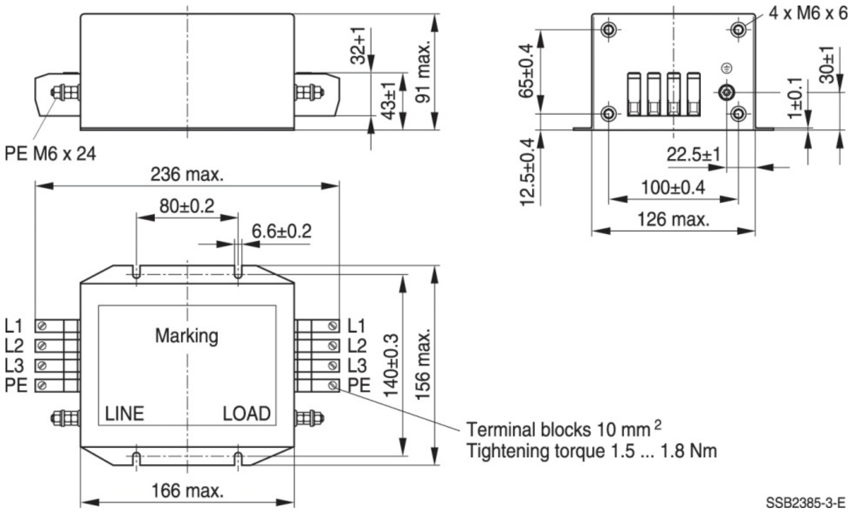
Characteristics and part numbers

I_R A	Terminal cross section mm^2	I_{leak} mA	R_{typ} μΩ	Approx weight kg	Part Number	Approvals		
						600/350V		
25	10	< 7	8.0	4	KRF0025VTB	-	X	X
36	10	< 7	3.8	4	KRF0036VTB	-	X	X
50	10	< 12	2.0	4	KRF0050VTB	-	X	X
80	25	< 12	1.0	9.5	KRF0080VTB	-	X	X
120	50	< 12	0.75	10	KRF0120VTB	-	X	X
150	50	< 12	0.4	10	KRF0150VTB	-	X	X
180	95	< 12	0.4	13	KRF0180VTB	-	X	X

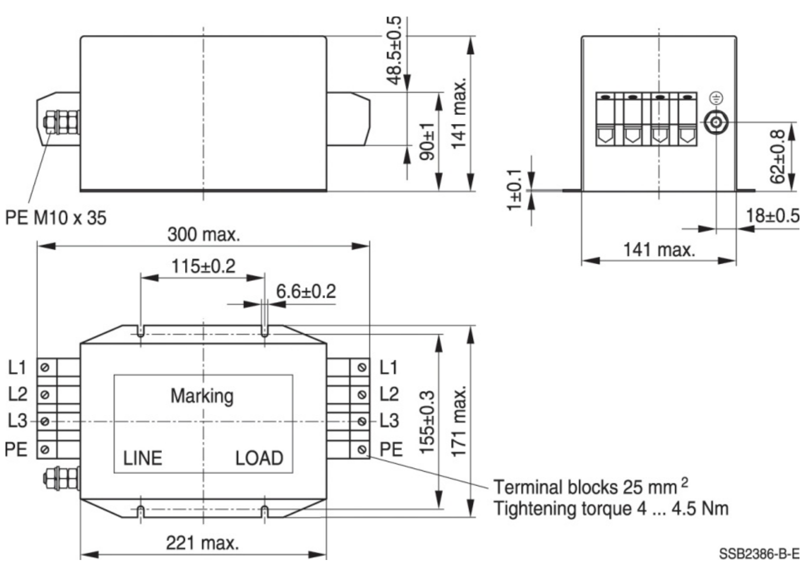
X = approval granted

Dimensional drawings

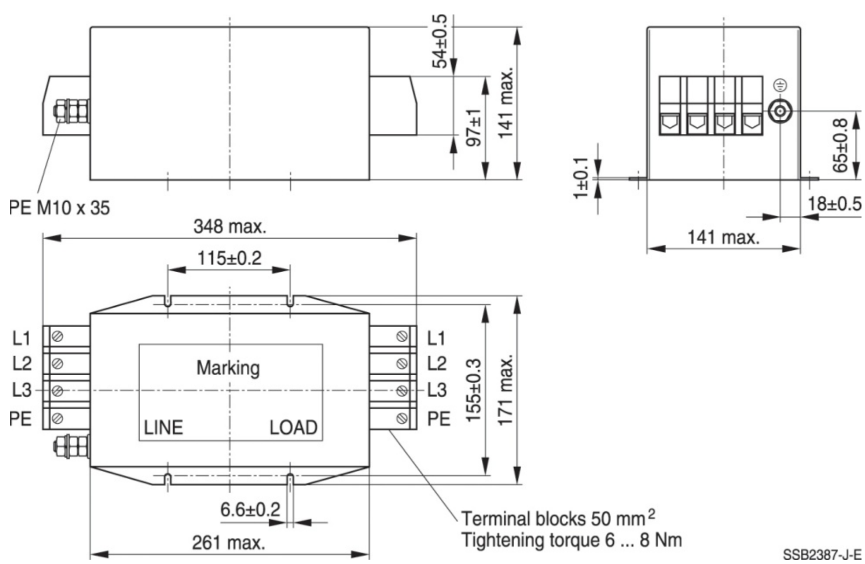
(25 A, 50 A) KRF0025VTB, KRF0050VTB



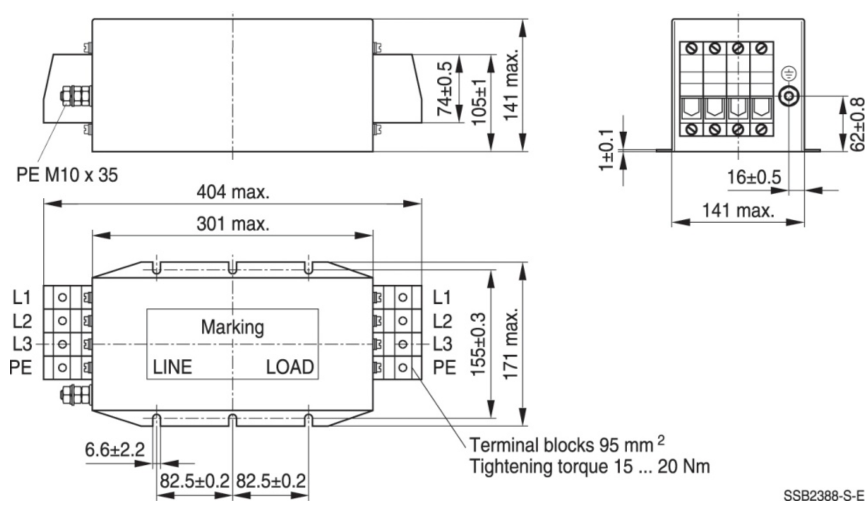
(80 A) KRF0080VTB



(120 A, 150 A) KRF0120VTB, KRF0150VTB



(180 A) KRF0180VTB

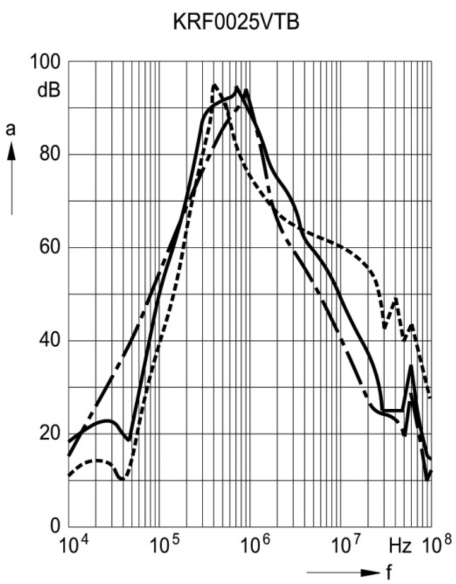


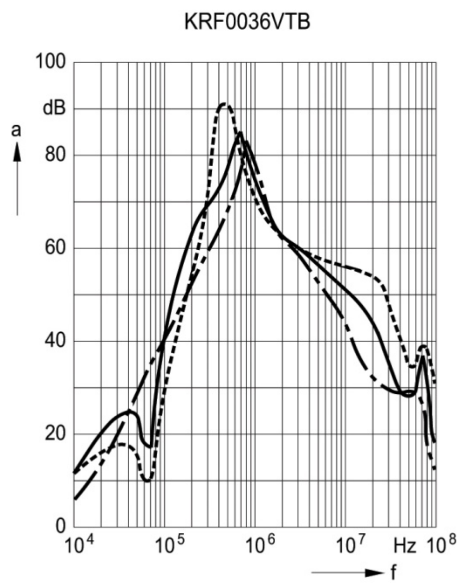
Insertion Loss (typical values at Z = 50 Ω)

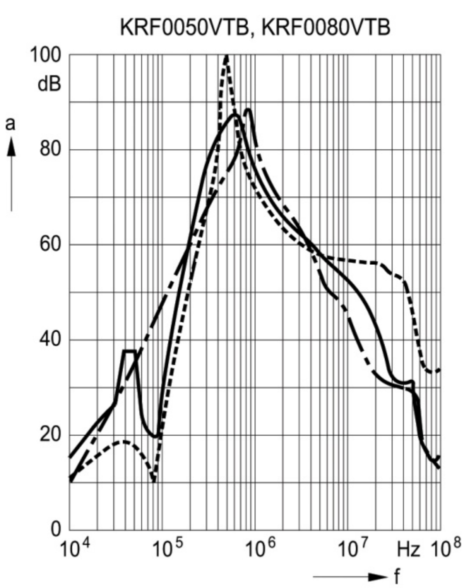
Unsymmetrical, adjacent branches terminated

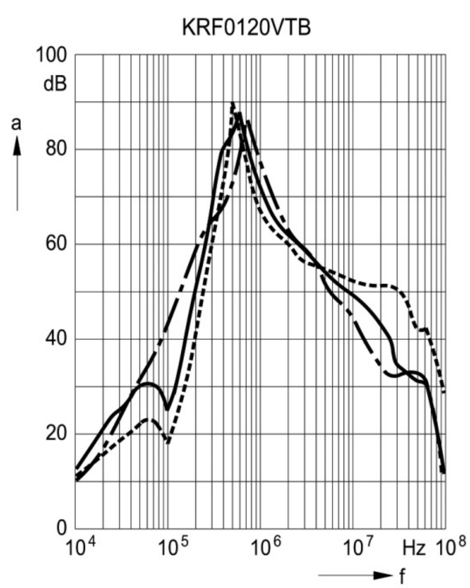
Common mode, all branches in parallel (asymmetrical)

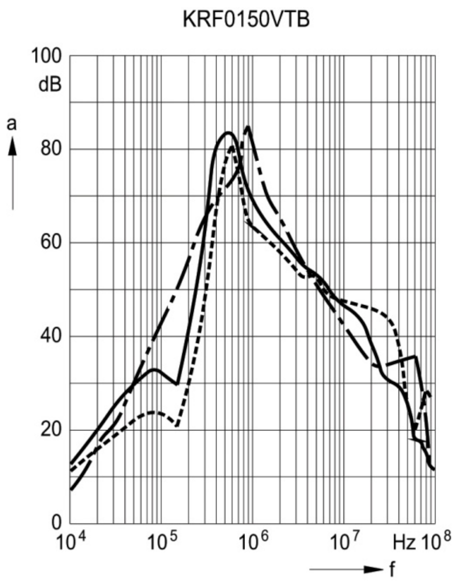
Differential mode (symmetrical)

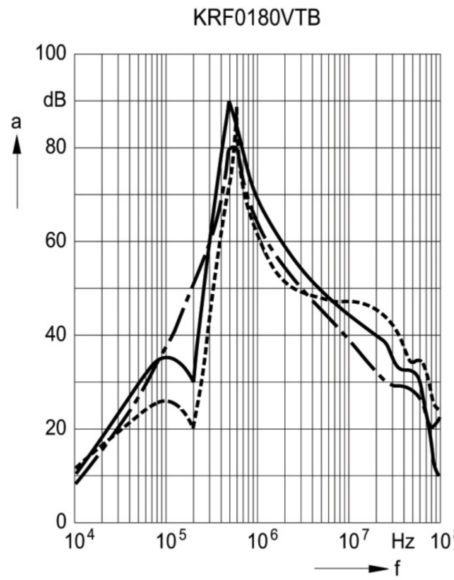









KRF0150VTB
100
dB
a
80
60
40
20
0
10^4
10^5
10^6
10^7
Hz 10^8
f


KRF0180VTB
100
dB
a
80
60
40
20
0
10^4
10^5
10^6
10^7
Hz
10^8
f

Section 5: 760V, CB, 150 – 2500A

EMC Filters
Phase: 3
Current: 150 to 2500 A
Voltage: 760/440 V AC, 50/60 Hz
Termination: Copper Bus

Part Numbers:
KRF0150VCB
KRF0180VCB
KRF0250VCB
KRF0320VCB
KRF0400VCB
KRF0600VCB
KRF1000VCB
KRF1600VCB
KRF2500VCB

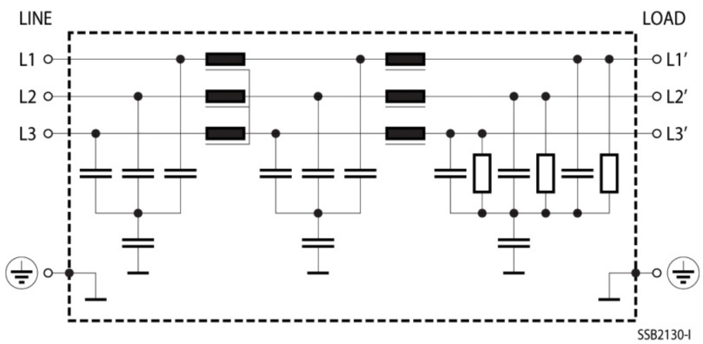
Construction
• 3-line filter
• Metal case

Features
• Optimized leakage current
• Easy to install
• Very compact design
• Optimized for operation under full load
• Low weight
• UL, cUL approval

Applications
• Frequency converters for motor drives
• Wind farms
• Power supplies

Terminals
• Busbars

Marking
Marking on component:
Manufacturer’s logo, ordering code,
rated voltage, rated current, rated temperature,
climatic category, date code
Typical circuit diagram



Technical data and measuring conditions

Rated voltage V_R	Type: 760/440 V AC, 50/60 Hz
Read current I_R	Referred to 40°C ambient temperature
	Type: 3270 V DC, 2 s (line/line) 2890 V DC, 2 s (lines/case)
	1.5 · I_R for 3 min per hour or 2.5 · I_R for 30 s per hour
Overload capability (thermal)	At V_R, 50 Hz
Leakage current I_{leak}	25/100/21 (-25°C/+100°C/21 days damp heat test)
Climatic category (IEC 60068-1)	UL 1283; CSA C22.2 No.8

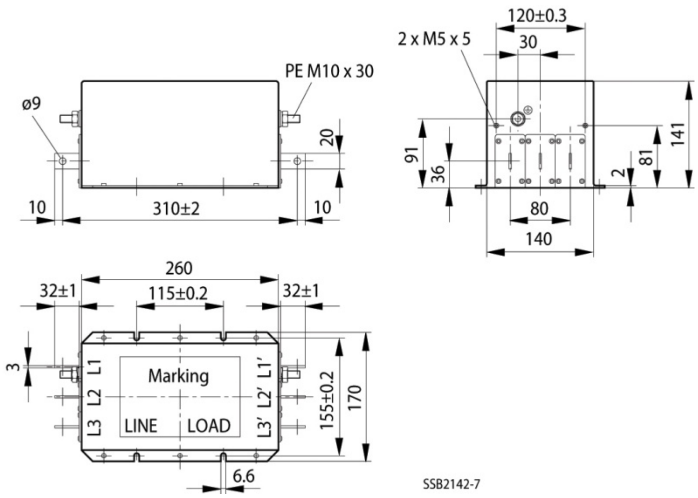
Characteristics and part numbers

V_R AC V	I_R A	I_{leak} mA	R_{typ} µΩ	Approx weight kg	Part Number	Approvals 600/350V (UL)	(cUL)
760/440	150	< 28	140	13	KRF0150VCB	X	X
	180	< 28	140	13	KRF0180VCB	X	X
	250	< 28	63	15	KRF0250VCB	X	X
	320	< 28	67	21	KRF0320VCB	X	X
	400	< 28	67	21	KRF0400VCB	X	X
	600	< 28	52	22	KRF0600VCB	X	X
	1000	< 28	33	28	KRF1000VCB	X	X
	1600	< 28	22	34	KRF1600VCB	X	X
	2500	< 28	15	105	KRF2500VCB	X	X

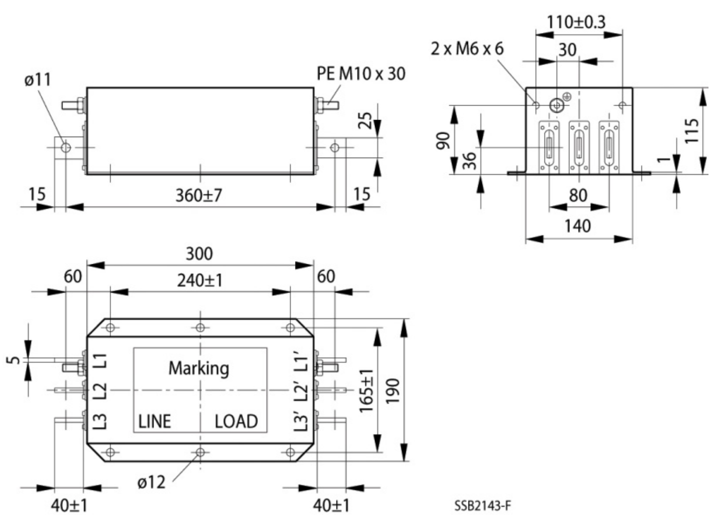
X = approval granted

Dimensional drawings

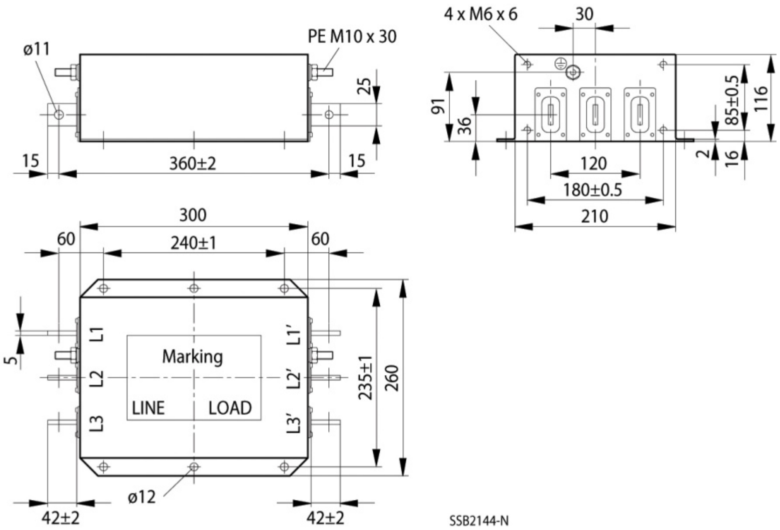
(150 A, 180 A) KRF0150VCB, KRF0180VCB



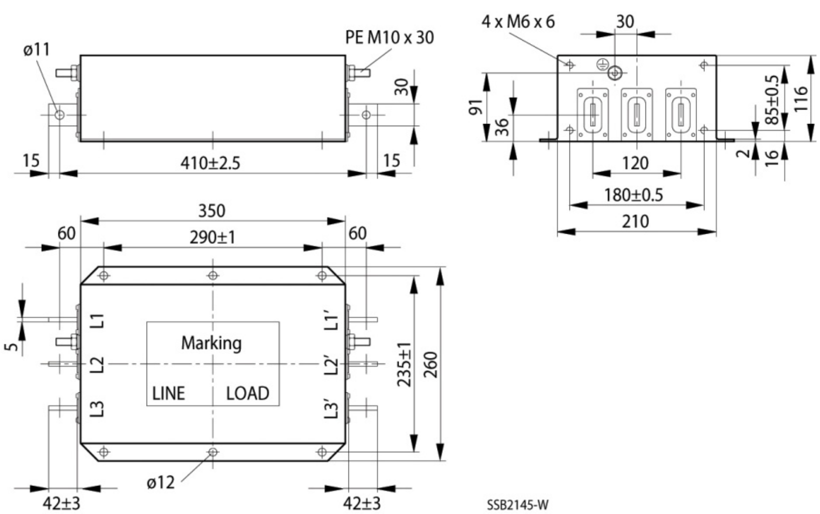
(250 A) KRF0250VCB



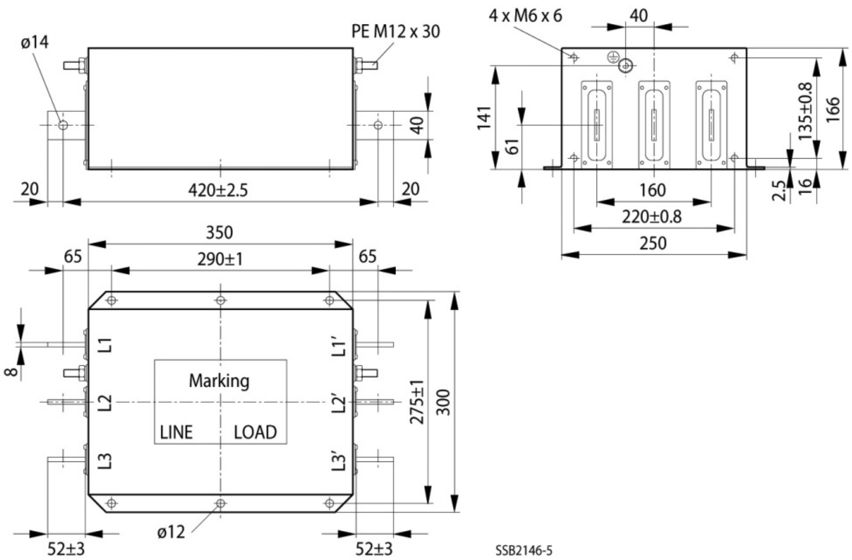
(320 A, 400 A) KRF0320VCB, KRF0400VCB



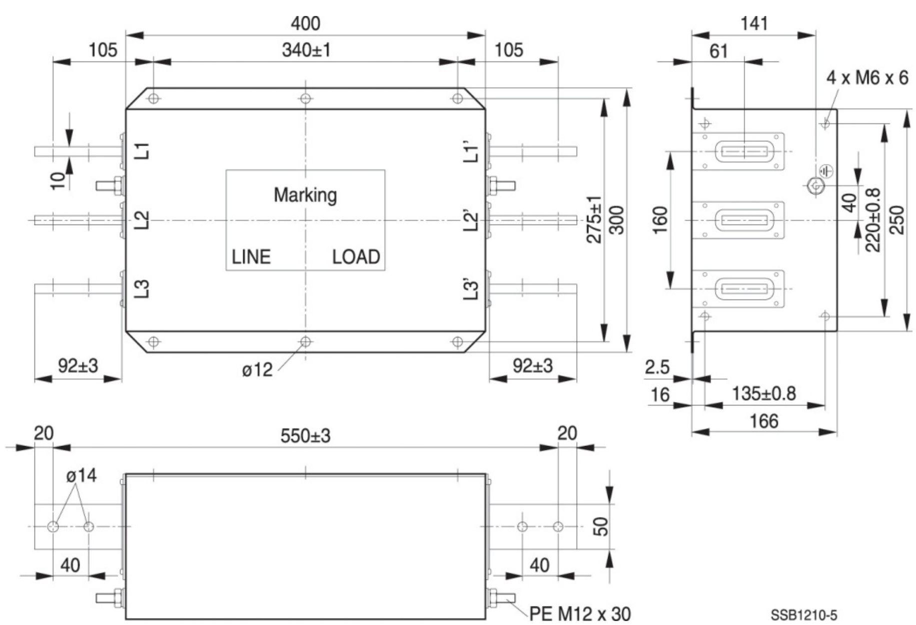
(600 A) KRF0600VCB



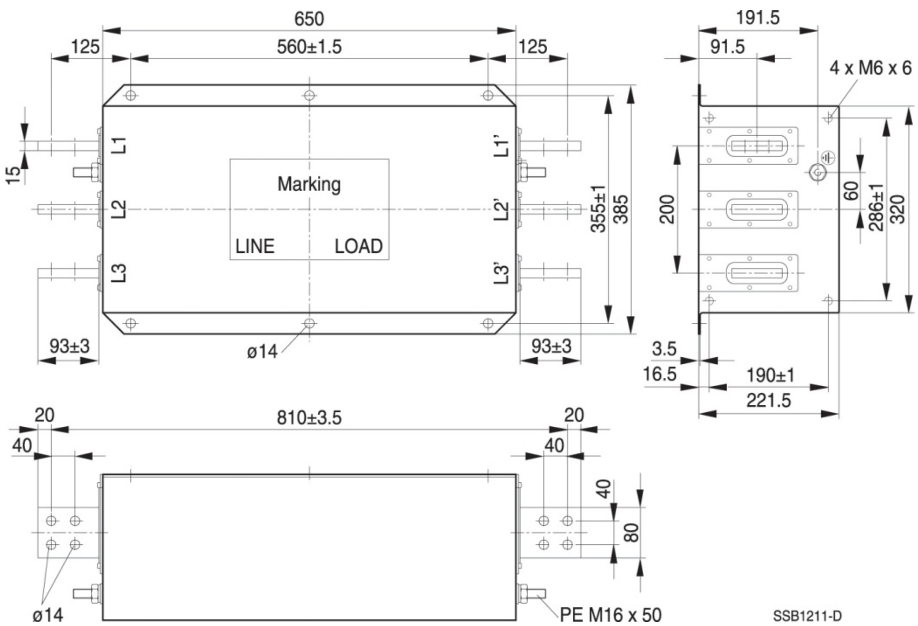
(1000 A) KRF1000VCB



(1600 A) KRF1600VCB



(2500 A) KRF2500VCB



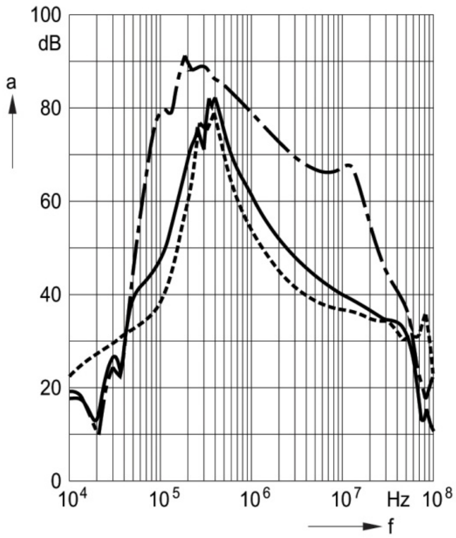
Insertion Loss (typical values at Z = 50 Ω)

Unsymmetrical, adjacent branches terminated

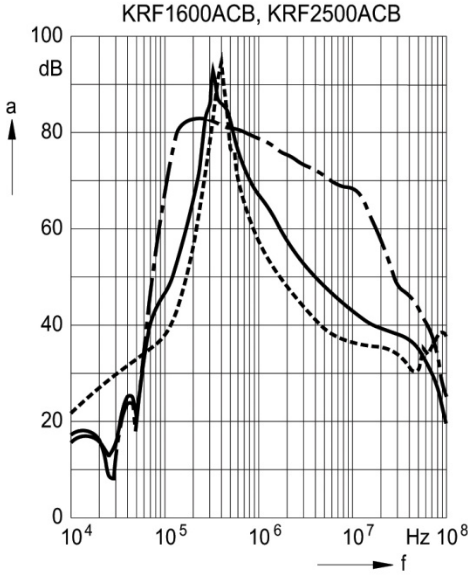
Common mode, all branches in parallel (asymmetrical)

Differential mode (symmetrical)

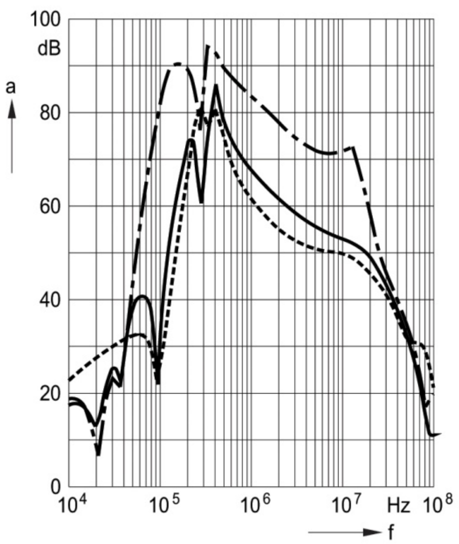
KRF0320VCB, KRF0400VCB, KRF0600VCB, KRF1000VCB



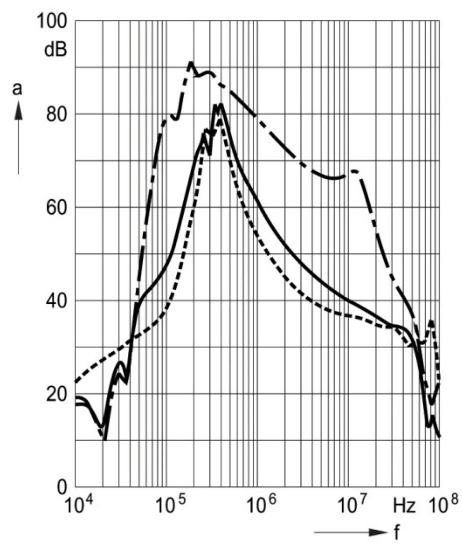
KRF1600ACB, KRF2500ACB



KRF0150VCB, KRF0180VCB, KRF0250VCB



KRF0320VCB, KRF0400VCB, KRF0600VCB, KRF1000VCB



KRF1600VCB, KRF2500VCB

